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AIR PRODUCTS AND CHEMICALS, INC.
PATENT DEPARTMENT
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EXAMINER

RIDLEY, BASIA ANNA

ART UNIT	PAPER NUMBER
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1764

DATE MAILED: 01/13/2003

9

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/666,420

Applicant(s)

PHAM ET AL.

Examiner

Basia Ridley



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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 04 November 2002.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-24 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-24 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 20 September 2000 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Title

1. The title of the invention is not descriptive as it encompasses both, the elected and non-elected, inventions. A new title is required that is clearly indicative of the invention to which the claims are directed.

Claim Objections

2. Claim(s) 1 and 21-24 are objected to because of the following informalities: the recitation "a first" in line 4 of claim 1 should be amended to --a first end--. Appropriate correction is required.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claim(s) 1-24 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim(s) 1 recite(s) the limitation(s) "said first end", line(s) 5. There is insufficient antecedent basis for said limitation(s) in the claim(s) as more than one first end is recited prior to said limitation(s) (e.g. first end of at least one combustion chamber in line(s) 2 of claim 1 and first end of at least one convection chamber in line(s) 4 of claim 1).

Claim(s) 1-2, 4-5, 11-13 and 16 recite(s) the limitation(s) "said combustion chamber" and "said convection chamber", throughout the claims. There is insufficient antecedent basis for said

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limitation(s) in the claim(s). Suggested correction is to replace said recitations with --said at least one combustion chamber-- and --said at least one convection chamber--, respectively.

Claim(s) 8, 18 and 22 recite(s) the limitation(s) "a hydrocarbon reforming process". Said claim(s) is/are indefinite as it is not clear what is the difference between hydrocarbon reforming process recited in said claim(s) and a hydrocarbon reforming process recited in line 1 of claims 2, 16 and 1. Suggested correction is to replace "a hydrocarbon reforming process" in claim(s) 8, 18 and 22 with --the hydrocarbon reforming process--.

Claim(s) 8, 18 and 22 recite(s) the limitation(s) "an apparatus". Said claim(s) is/are indefinite as it is not clear what is the difference between apparatus recited in said claim(s) and an apparatus recited in line 1 of claims 2, 16 and 1. Suggested correction is to replace "an apparatus" in claim(s) 8, 18 and 22 with --the apparatus--.

In claim(s) 19 and 23, it is not clearly stated that the first and second convection chambers are related to the at least one convection chamber in claim(s) 16 and 1, respectively. Suggested correction is --wherein the at least one convection chamber comprises a first convection chamber and a second convection chamber, and at least one duct connects the first convection chamber with the second convection chamber--.

Claim Rejections - 35 USC § 102

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless --

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

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6. Claim(s) 1 and 21 is/are rejected under 35 U.S.C. 102(b) as being anticipated by Arisaki et al. (USP 5,181,990).

Regarding claim(s) 1 and 21, Arisaki et al., in Fig. 1 and 5, disclose(s) similar apparatus comprising:

- at least one combustion chamber (1) having a first end and a second end opposite said first end;
- at least one convection chamber (6') having a first end and a second end opposite said first end;
- at least one burner (4) disposed in said combustion chamber (1), said burner adapted to combust a fuel, thereby generating a flue gas having sensible heat;
- communication means (26) between said combustion chamber (1) and said convection chamber (6') whereby at least a portion of said flue gas flows from said combustion chamber (1) to said convection chamber (6') at a first location adjacent said first end of said convection chamber (6');
- transfer means (Fig. 1 & 5) whereby at least a portion of said flue gas flows to a second location in said convection chamber (6') adjacent said second end of said convection chamber (6');
- a first reaction chamber (3, 12), a substantial portion of said first reaction chamber (3, 12) disposed in said combustion chamber (1);
- a second reaction chamber (6), a substantial portion of said second reaction chamber (6) disposed in said convection chamber (6'); and

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- communication means between said first reaction chamber (3, 12) and said second reaction chamber (6), whereby a fluid flows from or to said first reaction chamber (3, 12) to or from said second reaction chamber (6).

Instant claim(s) 1 and 21 structurally read(s) on apparatus of Arisaki et al.

7. Claim(s) 1-8, 11-18 and 21-22 is/are rejected under 35 U.S.C. 102(b) as being anticipated by Ohsaki et al. (USP 5,199,961).

Regarding claim(s) 1-8, 11-18 and 21-22, Ohsaki et al. disclose(s) similar apparatus comprising:

- a vessel (410) having at least one partition wall (27) disposed in said vessel (410), said at least partition wall (27) dividing said vessel into a plurality of chambers, including at least one combustion chamber (110) and at least one convection chamber (120);
- at least one burner (50) disposed in said combustion chamber (110), said burner (50) adopted to combust a fuel, thereby generating a flue gas having sensible heat;
- communication means (27) between said combustion chamber (110) and said convection chamber (120) whereby at least a portion of said flue gas flows from said combustion chamber (110) to said convection chamber (120) at a first location adjacent said first end of said convection chamber (120);
- transfer means (Fig. 1) whereby at least a portion of said flue gas flows to a second location in said convection chamber (120) adjacent said second end of said convection chamber (120);
- a first reaction chamber (10), a substantial portion of said first reaction chamber (10) disposed in said combustion chamber (110);

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- a second reaction chamber (10), a substantial portion of said second reaction chamber (10) disposed in said convection chamber (120);
- wherein said first and second reaction chambers are reforming reaction tubes (Abstract); and
- communication means between said first reaction chamber (10) and said second reaction chamber (10), whereby a fluid flows from or to said first reaction chamber (10) to or from said second reaction chamber (10);
- wherein the substantial portion of said first reaction chamber (10) is substantially vertical within said combustion chamber (Fig. 1);
- wherein the substantial portion of said second reaction chamber (10) is substantially vertical within said convection chamber (Fig. 1);
- wherein said second reaction chamber (10) is a tube-in-tube (Fig. 1);
- wherein said first reaction chamber (10) is a tube-in-tube (Fig. 1);
- an assembly of multiple units for a hydrocarbon reforming process (Fig. 2d).

Regarding limitations recited in claim 11-15 which are directed to a manner of operating disclosed apparatus, the examiner notes that neither the manner of operating a disclosed device nor material or article worked upon further limit an apparatus claim. Said limitations do not differentiate apparatus claims from prior art. See MPEP § 2114 and 2115.

Instant claim(s) 1-8, 11-18 and 21-22 structurally read(s) on apparatus of Ohsaki et al.

8. Claim(s) 1-2, 4-5, 8-11, 16, 18-20 and 22-24 is/are rejected under 35 U.S.C. 102(b) as being anticipated by Bruck (USP 4,440,727).

Regarding claim(s) 1-2, 11 and 16, Bruck disclose(s) similar apparatus comprising:

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- a vessel (1) having at least one partition wall (Fig. 1-3) disposed in said vessel (1), said at least partition wall dividing said vessel into a plurality of chambers, including at least one combustion chamber (2) and at least one convection chamber (3, 5);
- at least one burner (9) disposed in said combustion chamber (2), said burner (9) adopted to combust a fuel, thereby generating a flue gas having sensible heat;
- communication means (7) between said combustion chamber (2) and said convection chamber (3, 5) whereby at least a portion of said flue gas flows from said combustion chamber (2) to said convection chamber (3) at a first location adjacent said first end of said convection chamber (3);
- transfer means (Fig. 1-3) whereby at least a portion of said flue gas flows to a second location in said convection chamber (3) adjacent said second end of said convection chamber (3);
- at least one first reaction chamber (8), a substantial portion of said second reaction chamber (8) disposed in said combustion chamber (2);
- a second reaction chamber (4, 10), a substantial portion of said second reaction chamber (4, 10) disposed in said convection chamber (3, 5).

The examiner notes that term "reaction" recited in reference to second reaction chamber in claims 1-2 and 16 was given its broadest reasonable meaning.

Regarding limitations recited in claim 11 and 16 which are directed to a manner of operating disclosed apparatus, the examiner notes that neither the manner of operating a disclosed device nor material or article worked upon further limit an apparatus claim. Said limitations do not differentiate apparatus claims from prior art. See MPEP § 2114 and 2115.

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Regarding claim(s) 4-5, 8-10, 18-20, 22-24, Bruck disclose(s) similar apparatus comprising:

- wherein the substantial portion of said at least one first reaction chamber (8) is substantially vertical within said combustion chamber (Fig. 1-3);
- wherein the substantial portion of said at least one second reaction chamber (4, 10) is substantially vertical within said convection chamber (Fig. 1-3)
- an assembly of multiple units (C2/L60-63);
- wherein the at least one convection chamber (3, 5) comprises a first convection chamber (3) and a second convection chamber (5), and at least one duct connects the first convection chamber with the second convection chamber (Fig. 1-3); and
- at least one convection pass in communication with said at least one duct (Fig. 1-3).

Instant claim(s) 1-2, 4-5, 8-11, 16, 18-20 and 22-24 structurally read(s) on apparatus of Bruck.

Claim Rejections - 35 USC § 103

9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

10. Claim(s) 22 is/are rejected under 35 U.S.C. 103(a) as being unpatentable over Arisaki et al. (USP 5,181,990).

Regarding claim(s) 22, Arisaki et al. disclose(s) all of the claim limitations as set forth above except for reciting an assembly of multiple units. It would have been obvious to one having ordinary skill in the art at the time the invention was made to add additional units, since it

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has been held that mere duplication of the essential working parts of a device involves only routine skill in the art. *St. Regis Paper Co. v. Bemis Co.*, 193 USPQ 8.

11. Claim(s) 1-24 is/are rejected under 35 U.S.C. 103(a) as being unpatentable over Makabe et al. (USP 5,226,928) in view of Ohsaki et al. (USP 5,199,961).

Regarding claim(s) 1-2 and 16, Makabe et al., in Fig. 3A, disclose(s) similar apparatus comprising:

- a vessel having at least one partition wall (36) disposed in said vessel, said at least partition wall (36) dividing said vessel into a plurality of chambers, including at least one combustion chamber (21) and at least one convection chamber (24);
- at least one burner (41) disposed in said combustion chamber (21), said burner (41) adopted to combust a fuel, thereby generating a flue gas having sensible heat;
- communication means (Fig. 3A) between said combustion chamber (21) and said convection chamber (24) whereby at least a portion of said flue gas flows from said combustion chamber (21) to said convection chamber (24) at a first location adjacent said first end of said convection chamber (24);
- transfer means (Fig. 3A) whereby at least a portion of said flue gas flows to a second location in said convection chamber (24) adjacent said second end of said convection chamber (24);
- a second reaction chamber (O), a substantial portion of said second reaction chamber (O) disposed in said convection chamber (24);
- wherein said second reaction chamber is reforming reaction tube (Abstract).

While the reference does not explicitly disclose a first reaction chamber wherein a substantial portion of said first reaction chamber is disposed in said combustion chamber.

Ohsaki et al., in Fig. 1., teaches a reforming apparatus wherein the reforming reaction tube is disposed in a combustion chamber. Further Ohsaki et al. teaches that it is known to increase the capacity of reforming apparatus by, among others, increasing the number of reforming tubes (C1/L51-C2/L8), and that disclosed arrangement provides high capacity apparatus with high heat recovery efficiency and a lower energy consumption (C1/L4-9) without increasing the size of said apparatus (C2/L23-28).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to add a first reaction chamber, wherein a substantial portion of said first reaction chamber is disposed in said combustion chamber, as taught by Ohsaki et al., to the apparatus of Makabe et al. for the purpose of increasing the capacity of said apparatus without increasing size of said apparatus by increasing heat transfer efficiency.

Regarding claim(s) 3, 17 and 21, Makabe et al. in view of Ohsaki et al. disclose(s) all of the claim limitations as set forth above. Additionally Ohsaki et al. discloses the apparatus further comprising:

- communication means between a first reaction chamber (located in a combustion chamber) and said second reaction chamber (located in a convection chamber), whereby a fluid flows from or to said first reaction chamber to or from said second reaction chamber.

Regarding claim(s) 4-7, Makabe et al. in view of Ohsaki et al. disclose(s) all of the claim limitations as set forth above. Additionally Makabe et al. and Ohsaki et al. discloses the apparatus wherein:

- the substantial portion of said first reaction chamber is substantially vertical within said combustion chamber (Makabe et al., Fig. 3A and Ohsaki et al. Fig. 1);

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- the substantial portion of said second reaction chamber is substantially vertical within said convection chamber (Ohsaki et al. Fig. 1);
- wherein said second reaction chamber is a tube-in-tube (Makabe et al., Fig. 3A and Ohsaki et al. Fig. 1);
- wherein said first reaction chamber is a tube-in-tube (Ohsaki et al. Fig. 1).

Regarding claim(s) 8, 18 and 22, Makabe et al. in view of Ohsaki et al. disclose(s) all of the claim limitations as set forth above but Makabe et al. does not explicitly disclose an assembly of multiple units. It would have been obvious to one having ordinary skill in the art at the time the invention was made to add additional units, since it has been held that mere duplication of the essential working parts of a device involves only routine skill in the art (*St. Regis Paper Co. v. Bemis Co.*, 193 USPQ 8.) and since Ohsaki et al. explicitly teaches an assembly of multiple units (Fig. 2d).

Regarding claim(s) 9-10, 19-20 and 23-24, Makabe et al. in view of Ohsaki et al. disclose(s) all of the claim limitations as set forth above. Additionally Makabe et al. discloses the apparatus wherein:

- the at least one convection chamber comprises a first convection chamber and a second convection chamber, and at least one duct connects the first convection chamber with the second convection chamber (Fig. 3A); and
- at least one convection pass in communication with said at least one duct (Fig. 3A).

Regarding limitations recited in claim 11-15 which are directed to a manner of operating disclosed apparatus, the examiner notes that neither the manner of operating a disclosed device

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nor material or article worked upon further limit an apparatus claim. Said limitations do not differentiate apparatus claims from prior art. See MPEP § 2114 and 2115.

12. Claim(s) 1-24 is/are rejected under 35 U.S.C. 103(a) as being unpatentable over Bruck (USP 4,440,727) in view of Ohsaki et al. (USP 5,199,961).

While the reference does not explicitly disclose a first reaction chamber wherein a substantial portion of said first reaction chamber is disposed in said combustion chamber.

Ohsaki et al., in Fig. 1., teaches a reforming apparatus wherein the reforming reaction tube is disposed in a combustion chamber. Further Ohsaki et al. teaches that it is known to increase the capacity of reforming apparatus by, among others, increasing the number of reforming tubes (C1/L51-C2/L8), and that disclosed arrangement provides high capacity apparatus with high heat recovery efficiency and a lower energy consumption (C1/L4-9) without increasing the size of said apparatus (C2/L23-28).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to add a first reaction chamber, wherein a substantial portion of said first reaction chamber is disposed in said combustion chamber, as taught by Ohsaki et al., to the apparatus of Makabe et al. for the purpose of increasing the capacity of said apparatus without increasing size of said apparatus by increasing heat transfer efficiency.

13. Claim(s) 3, 17 and 21 is/are rejected under 35 U.S.C. 103(a) as being unpatentable over Bruck (USP 4,440,727) in view of Arisaki et al. (USP 5,181,990).

Regarding claim(s) 3, 17 and 21, Bruck disclose(s) all the claim limitations as set forth above. Additionally the reference discloses that convective heat is being used to heat a fluid in

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second reaction tubes, wherein said fluid is latter used in the apparatus (C1/L42-48), but it does not disclose that said preheated fluid is being fed to the first reaction tubes.

Arisaki et al. teaches an apparatus comprising a first reaction chamber (12) substantially located in a combustion chamber (1) and a second reaction chamber (6) substantially located in a convection chamber (6'), further comprising communication means between said first reaction chamber (12) and said second reactin chamber (6), whereby a fluid flows from or to said first reaction chamber (12) to or from said second reaction chamber (6). Said arrangement is used to provide additional heat required by endothermic reaction being performed in said apparatus by pre-heating feed, and therefore it improves the apparatus efficiency by lowering operation cost.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to pass feed for the first reaction chamber through the second reaction chamber before said feed enters said first reaction chamber, as taught by Arisaki et al., in the apparatus of Bruck, for the purpose of providing additional heat required by endothermic reaction being performed in said apparatus by pre-heating feed, and therefore for improving the apparatus efficiency by lowering operation cost.

14. Claim(s) 6-7 and 12-15 is/are rejected under 35 U.S.C. 103(a) as being unpatentable over Bruck (USP 4,440,727) in view of Ohsaki et al. (USP 5,199,961).

Regarding claim(s) 6-7, Bruck disclose(s) all the claim limitations as set forth above, but it does not disclose that said first and second reaction chambers are tube-in-tube.

Ohsaki et al. teaches an apparatus for performing endothermic reactions, wherein the efficiency of said apparatus is improved by the reaction tubes being tube-in-tube, allowing for

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additional heat transfer to the endothermic process from the products of said endothermic process (C1/L4-C2/L40).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to use tube-in-tube as a first and second reaction tubes in the apparatus of Bruck, as taught by Ohsaki et al., for the purpose of improving the apparatus efficiency by lowering the operating cost.

Regarding limitations recited in claim 12-15 which are directed to a manner of operating disclosed apparatus, the examiner notes that neither the manner of operating a disclosed device nor material or article worked upon further limit an apparatus claim. Said limitations do not differentiate apparatus claims from prior art. See MPEP § 2114 and 2115.

15. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Response to Arguments

16. Applicant's arguments filed on 4 November 2002 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

17. In view of the foregoing, none of the claims are allowed.


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18. Any inquiry concerning this communication or earlier communications from the examiner should be directed to examiner Basia Ridley, whose telephone number is (703) 305-5418. The examiner can normally be reached on Monday through Thursday, from 8:30 AM to 7:00 PM.


If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Glenn Caldarola, can be reached on (703) 308-6824.

The fax phone number for Group 1700 is (703) 872-9311 (for Official papers after Final), (703) 872-9310 (for other Official papers) and (703) 305-6078 (for Unofficial papers). When filing a fax in Group 1700, please indicate in the Header (upper right) "Official" for papers that are to be entered into the file, and "Unofficial" for draft documents and other communication with the PTO that are not for entry into the file of the application. This will expedite processing of your papers.

Any inquiry of a general nature or relating to the status of this application should be directed to the Group receptionist whose telephone number is (703) 308-0661.

Basia Ridley 
Examiner
Art Unit 1764

BR
January 8, 2003


Glenn Caldarola
Supervisory Patent Examiner
Technology Center 1700